

St. Croix County Ground and Surface Water Quality Study Group

Presentation Notes

Date:	March 14, 2017
Presenters(s):	<ul style="list-style-type: none"> • Paul Juckem, Hydrologist, USGS – Wisconsin Water Science Center • Joel Stodyk, Laboratory of Infectious Diseases, & Wisconsin Water Science Center • Mark Borchardt, Research Microbiologist, USDA Agricultural Research Service, Environmentally Integrated Dairy Management Research Unit & Affiliate, USGS Water Sciences Center. Also Principal Investigator for Kewaunee County study.
Key Impacts:	<p><i>Findings: St. Croix County's groundwater is locally generated in the county by rains that infiltrate through the ground to the water table. Much, but not all, of St. Croix County's topography, has two physical qualities that create favorable conditions for filtering (thus cleansing water by the time it gets to the water table: 1) Sandstone soils that provide natural filtration of water, occurring at 2) depths-to-bedrock of greater than 5 feet. Combined, these conditions are favorable for the natural filtration of water. This is important because groundwater is accessed through private wells as the source of drinking water for rural residences and businesses.</i></p> <p><i>Where these physical conditions don't exist, there is a higher likelihood that contaminants will reach the water table.</i> Based on aggregated data of water samples in St. Croix County there are concentrated areas of groundwater contamination in the county. Especially in areas with higher vulnerability for contamination, existing land use plans, policies, and regulations do not appear to be sufficient to protect the quality of groundwater as a reliable source of safe drinking water for the county's rural residents. Our means and methods for water quality protection must become more sophisticated as science and technology tools become more sophisticated.</p> <p><u><i>These potential impacts concern us most:</i></u> <i>Research indicates that residential and agricultural land uses contribute three primary contaminants to the groundwater: 1) nitrate from land application of commercial fertilizer and manure, 2) human bacteria from wastewater from on-site septic system effluent and, 3) bovine bacteria from animal manure.</i></p> <p><i>Contaminants are transported by water as it infiltrates from the land surface to the water table. Research also indicates contamination vulnerability is heightened during water recharge events (rains, snow melt) in concert with manure application AND/OR on-site septic system function. Physical conditions that contribute to the potential for contamination include: 1) fissures resulting from Karst topography, and 2) shallow depth to bedrock—both of which accelerate the groundwater transport—without the protective filtration provided by water traveling through several feet of porous soils.</i></p> <p><i>Potential for contamination is exacerbated by high densities of animal feeding operations, high densities of septic systems and limitations of the effectiveness of septic systems. Shallow wells may also result in a higher potential for contaminated groundwater to be used as drinking water.</i></p>

Data Needs or Gaps:	<p><u>More information is needed on:</u></p> <ol style="list-style-type: none"> 1) Baseline (2017) information on groundwater quality throughout the county to analyze current condition of St. Croix County groundwater so we can judge over time if groundwater quality is improving or getting worse. 2) Groundwater modeling during water recharge events in strategic locations to determine contaminant sources, travel times, and directional flow of groundwater. 3) Map depth to bedrock in St. Croix County. 4) Obtain more information on well depths and well conditions in St. Croix County. 5) Investigate industry initiatives to make on-site wastewater systems more effective in removing contaminants. <p>See recommendations below.</p>
Policy or Program Gaps:	<p><u>Existing policies, rules, or programs do not appear to address:</u></p> <ol style="list-style-type: none"> 1) The impact of high capacity wells on the neighboring water supply and water quality.
Opportunities for Action:	<p><u>Planning, study, monitoring, and tracking</u></p> <ol style="list-style-type: none"> 1) Engage USGS to conduct baseline study of rural water quality in St. Croix County, using a (large) scientifically selected sample, employing high quality-control standards to countywide. (Similar to the analysis done in Kewaunee County as described by Borchardt/Stodyk). 2) Conduct scientifically designed groundwater flow modeling in St. Croix County during water recharge events in strategic locations to simulate flow direction, velocity, degree of contamination and karst effect. 3) Map depth to bedrock in St. Croix County to identify potential susceptibility to contamination. 4) Map Karst topography in St. Croix County to identify potential susceptibility to contamination. 5) Review past recommendations cited by Juckem in water study during Fodroczi/Janke leadership.
	<p><u>Rules, regulations, permitting, and compliance</u></p> <ol style="list-style-type: none"> 1) Consider identifying scientifically defensible site-specific (or zone-specific) framework to identify areas highly susceptible to contamination. Restrict land spreading and siting of concentrated animal operations for the protection of groundwater in designated susceptible zones. 2) Consider county permitting of wells to capture better data on depth, testing and abandonment.
	<p><u>Best practices and programming</u></p> <ul style="list-style-type: none"> • Despite best practices, leaks/breaches of wastewater vessels will occur. We need to establish best practices for communicating with neighboring property owners and/or the public at large in such cases. How do we create a continuous improvement culture whereby we encourage reporting and come together for an effective clean-up. Covering up spills and leaks—especially on permitted operations—hurts everyone.

Education, communications, and other

- *How do we keep St. Croix County enthusiastically “open for agriculture?” AND protect our groundwater ? We have half the cows the county once had. Is it in the best interest of the county to get back to that level? Or, do we need to as cows produce much more per cow than what they used to produce.*
- *We haven’t heard anything about how herbicides affect our groundwater. We need to hear from an expert.*
- *Irrigation systems sometimes appear to be operated in a wasteful manner—running during rain or high heat. Comments? Is there a need for better DNR observation, or else better control of irrigators on timers by the owners?*
- *Operators of high-capacity wells are required to report production to DNR. Is this information ever verified by an independent third party? What happens with this information? Is the impact on the aquifer analyzed?*
- *Only 37% of the nitrogen used on crops is assimilated into the plant, the rest is leaching back into the groundwater. Let’s hear from industry experts on how they are improving the efficiency of commercial fertilizer.*
- *Tell us more about the research related to the “capacity” of the land to handle livestock. 2.47 cows per hectare? What is the “rule of thumb” for density of animal units and what is its foundation in science? In law?*
- *What in-home water treatment options are available for rural home owners with well water. What do they cost? How common are they? When are they appropriate?*
- *What is the state of the art regarding the effectiveness of on-site septic systems to treat contamination? What does the industry say? What are the implications of a higher level of treatment. Is there an existing standard for effluent?*